

# A new subsection and two new subseries for *Boronia* Sm. section *Valvatae* (Benth.) Engl. (Rutaceae)

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## Summary

Duretto, M.F. (2008). A new subsection and two new subseries for *Boronia* Sm. section *Valvatae* (Benth.) Engl. (Rutaceae). *Austrobaileya* 7(4): 665–668. Three infrageneric taxa are newly described for *Boronia* Sm. section *Valvatae* (Benth.) Engl.: these being *B.* subsection *Anomala* Duretto, and *B.* subseries *Lanceolatae* Duretto and *B.* subseries *Rosmarinifoliae* Duretto of *B.* series *Valvatae*. Descriptions and notes on the distribution and species composition of each new taxon and *B.* subseries *Valvatae* are provided.

Key Words: Rutaceae, *Boronia*, *Boronia* section *Valvatae*, *Boronia* subsection *Anomala*, *Boronia* series *Valvatae*, *Boronia* subseries *Valvatae*, *Boronia* subseries *Lanceolatae*, *Boronia* subseries *Rosmarinifoliae*

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## Introduction

*Boronia* Sm. section *Valvatae* (Benth.) Engl. *sensu lato* was the subject of cladistic analyses using morphological and anatomical characters that resulted in the publication of the first infrageneric classification for the section (Duretto & Ladiges 1999; Duretto 1999). In those studies a number of taxonomic issues were identified and some taxa were treated as *incertae sedis* and a number of species and species-groups were informally identified. In anticipation of the *Flora of Australia* account of the genus these informal taxa are being formally described, where appropriate, or placed in synonymy (see also Duretto accepted), and the position of one of the taxa treated as *incertae sedis* is resolved.

*Boronia anomala* Duretto was treated as *incertae sedis* in *B.* section *Valvatae* as its taxonomic relationships with the four formally recognised subsections were unclear (Duretto 1999). A new subsection is described here to accommodate it. The main reason for describing a new subsection for this species is to have the formal taxonomy reflect the current understanding of the relationships of species in the section. *Boronia anomala* is an unusual species and though it appears to be more closely related to *B.* subsection

*Grandisepalae* Duretto (NW Australia) this is not certain (Duretto 1999) and requires further investigation. The current formal classification of *B.* section *Valvatae* will now reflect current understanding of the group and taxonomically isolated taxa should be easily identifiable by being members of higher taxonomic taxa, in this case a subsection. Species that are the sole representatives of higher taxonomic groups have a high conservation value (see Humphries *et al.* 1995) and this information is more easily extracted from a formal classification than it is from informal and/or uncertain ones. The formal description of an infrageneric taxon to accommodate *B. anomala* will hopefully prompt further research on this species.

One of the larger clades identified by Duretto & Ladiges (1999) and Duretto (1999) was *Boronia* series *Valvatae* which contains 24 species. Support for the nodes within *B.* series *Valvatae* was weak and the entire clade was susceptible to collapse if taxa and/or characters were deleted and/or added to the cladistic dataset (Duretto & Ladiges 1999; Duretto 1999; Duretto *et al.* 2004). With this in mind, a cautious approach was adopted and the four main clades in *B.* series *Valvatae* were treated as informal species-groups: viz. the *B. alulata* species-group, the *B. foetida* species-group, the *B. lanceolata* species-

group and the *B. rosmarinifolia* species-group (Duretto & Ladiges 1999; Duretto 1999). These groups remained stable in later analyses with the addition of new taxa (Duretto 2003; Duretto *et al.* 2004). The *B. foetida* and the *B. lanceolata* species-groups, with additional collections and a re-evaluation of their morphological descriptions, have proved to be indistinguishable and are thus combined.

These three informal species-groups are here formally described as subseries. This is being done firstly, because they are higher taxa worthy of formal recognition and in hindsight the approach adopted in 1999 was overly cautious, and secondly, a formal taxonomy is more stable and of greater value compared to an informal classification which can become problematic in the long term and invariably does not become adopted. The *Boronia alulata* species-group contains the type species of *B.* section *Valvatae*, *B. alulata* Sol. ex Benth., and becomes *B.* subseries *Valvatae*.

Three species in *Boronia* series *Valvatae*, *B. chartacea* P.H.Weston, *B. hapalophylla* Duretto, F.J.Edwards & P.G.Edwards, and *B. ledifolia* (Vent.) DC., fall outside these new subseries and are treated as *incertae sedis* (Duretto & Ladiges 1999; Duretto 1999; Duretto *et al.* 2004). Further research using additional data (especially molecular) is required to elucidate relationships of these taxa.

## Taxonomy

**Boronia** section **Valvatae** (Benth.) Engl., *Nat. Pflanzen.* 3(4): 135 (1896); *Boronia* series *Valvatae* Benth., *Fl. Austral.* 1: 308, 311 (1863).

**Type species:** *Boronia alulata* Benth., *fide* Duretto (1999: 56).

The section is classified into five subsections: subsection *Anomala* Duretto (described below, northern Western Australia (N WA)), subsection *Bowmaniorum* Duretto (Cape York, northern Queensland (Qld)), subsection *Grandisepalae* Duretto (N WA, Northern Territory (NT), north-west Qld), subsection *Ternatae* Duretto (south-western WA) and

subsection *Valvatae* (NT, Qld, New South Wales (NSW), Victoria) (see Duretto 1999 for full descriptions).

**Boronia** subsection **Anomala** Duretto, **subsectio nova** a subsectione typica pilis non stellatis, petalis caducis, filamentis staminum clavatis, antheris antipetalis multo longioribus quam antheris antisepalis differt.

**Type species:** *Boronia anomala* Duretto

Glabrous except for adaxial surface of petals and staminal filaments; stellate hairs absent. Branches with decurrent leaf bases. Leaves imparipinnate; rachis segments linear; lamina dorsiventral, epicuticular wax platelets absent; midrib impressed on the adaxial surface, not raised on the abaxial surface, with tightly packed tissue between midvein and abaxial epidermis. Inflorescence 1–3-flowered, axillary. Sepals much smaller than petals [aestivation unknown], persistent with fruit. Petals without a raised midrib abaxially, valvate in bud, caducous with fruit. Stamens: filaments clavate, suddenly narrowing at apex so as to appear truncated before connecting to anther, pilose along the margins below the glandular tip; anthers attached to the apex of the filament; antipetalous anthers much larger than antisepalous anthers; anther-apiculum minute. Seed (mature not seen) black, shiny, possibly slightly rugulose, adaxial side flattened and without ridge.

**Notes:** *Boronia* subsection *Anomala* is distinguished from the four other subsections of *B.* section *Valvatae* by the lack of stellate hairs and the deciduous petals. The presence of stellate hairs and persistent petals are apomorphies for *B.* section *Valvatae* (less *B. anomala*) (Duretto & Ladiges 1999; Duretto 1999). Other apomorphies for the section are the axillary inflorescences and the sepals and petals being valvate in bud. *Boronia anomala* has these features apart from the sepal aestivation character which is unknown for the species. Sepal aestivation and mature seed morphology are key characters in the classification of *Boronia* and both are unknown for *B. anomala*. The seed possibly being slightly rugulose is interesting as in *Boronia* this feature only

occurs elsewhere in *B.* sections *Imbricatae* Engler and *Cyanothamnus* (Lindl.) F.Muell. Together with *B.* subsection *Grandisepalae*, which is also confined to north-western Australia, *B. anomala* shares the pinched staminal filaments and relatively large antepetalous anthers but lacks the large sepals characteristic of *B.* subsection *Grandisepalae*. In the analysis described by Duretto (1999), where the sepal aestivation was scored as 'unknown', *B. anomala* was sister to *B.* subsection *Grandisepalae* in 80% of the found trees and to either *B.* subsection *Valvatae* or *B.* subsection *Bowmaniorum* in the remaining trees. In these cases it would appear that the lack of stellate hairs and deciduous petals are secondary losses for the species.

It is worth noting that geographically restricted and taxonomically isolated subgeneric taxa in *Boronia* with large numbers of autapomorphies are not unusual in north-western Australia: see also *B.* series *Quadrilatae* Duretto and *B.* series *Rupicola* Duretto (Duretto & Ladiges 1999; Duretto 1999, accepted).

The subsection is monotypic and confined to the Kimberley Region of northern Western Australia (see Duretto 1999 for additional information on *Boronia anomala*).

### **Boronia** series *Valvatae*

A series of four subseries (see below) that contain 21 species, plus an additional three species, *Boronia chartacea*, *B. hapalophylla* and *B. ledifolia*, that are treated as *incertae sedis* (see above). Full descriptions, keys to taxa and notes on all but two species are given by Duretto (1999). *Boronia beeronensis* Duretto and *B. hapalophylla* are discussed in full by Duretto (2003) and Duretto *et al.* (2004) respectively.

### **Boronia** subseries *Valvatae*

*Boronia alulata* species-group, *fide* Duretto, (1999: 63)

Leaves petiolate, imparipinnate, the younger distal leaves not unifoliolate; leaflets linear to broadly elliptic to spatulate, obtuse to acute, margins slightly recurved to revolute, midribs

impressed on the adaxial surface, raised on the abaxial surface, the cells between midvein and abaxial epidermis with secondary thickening. Inflorescence 1-many flowered. Sepals narrowly ovate-deltate to narrowly deltate (except *B. umbellata*), acute; abaxial surface with a moderately dense indumentum, often dark in colour.

**Notes:** *Boronia* subseries *Valvatae* is characterised by the following combination of characters: imparipinnate leaves that have raised midribs with secondary thickening on the abaxial surface, and the narrowly deltate sepals. *Boronia umbellata* P.H.Weston does not have narrowly deltate sepals but is the sister species of *B. mollis* A.Cunn. ex Lindl. (Duretto & Ladiges 1999; Duretto 1999) and the lack of the narrowly deltate sepals appears to be a secondary loss.

*Boronia* subseries *Valvatae* contains eight species (*B. alulata*, *B. amabilis* S.T.Blake, *B. angustisepala* Duretto, *B. hoipolloi* Duretto, *B. mollis*, *B. obovata* C.T.White, *B. quinkanensis* Duretto, *B. umbellata*) found from Cape York (N Qld) to the Sydney region (NSW) and in north-western Queensland (Fig. 10 in Duretto 1999).

**Boronia** subseries *Lanceolatae* Duretto, **subseries nova** a subserie typica sepalis late deltatis abaxialiter dense tomentosis, ad apicem acuminatis usque acutis differt.

**Type species:** *Boronia lanceolata* F.Muell.

*Boronia lanceolata* species-group, *fide* Duretto, *Muelleria* (1999: 74)

*Boronia foetida* species-group, *fide* Duretto, *Muelleria* (1999: 84)

Leaves petiolate, imparipinnate or simple, leaves often becoming simple distally; leaflets or simple leaves narrowly to broadly elliptic, acute, the margins plane to slightly recurved (sometimes revolute on drying); midrib impressed on the adaxial surface, raised prominently on the abaxial surface, the cells between midvein and abaxial epidermis with secondary thickening. Inflorescence 1-many-flowered. Sepals broadly deltate, acuminate to acute, abaxial surface with a dense, fawn stellate indumentum.

**Notes:** *Boronia* subseries *Lanceolatae* is characterised by the presence of ovate-deltate sepals, and petiolate leaves that have prominently raised midribs with secondary thickening. All species have large simple leaves except *B. duiganiae* Durretto which usually has pinnate leaves, and *B. odorata* Durretto which sometimes has juvenile leaves that are trifoliolate.

*Boronia* subseries *Lanceolatae* contains seven species (*B. bella* Durretto, *B. duiganiae*, *B. excelsa* Durretto, *B. foetida* Durretto, *B. jensziae* Durretto, *B. lanceolata*, *B. odorata*) and is found in the ‘Top End’ of the Northern Territory and eastern Queensland (Figs 11 & 13 in Durretto 1999).

**Boronia** subseries **Rosmarinifoliae** Durretto, **subseries nova** a subserie typica foliis simplicibus sessilibus, cellulis costae abaxialibus sine densatione secundaria differt.

**Type species:** *Boronia rosmarinifolia* A.Cunn. ex Endl.

*Boronia rosmarinifolia* species-group, *fide* Durretto (1999: 78)

Leaves sessile, simple, linear to elliptic to obovate, obtuse, margin plane to revolute; midvein impressed slightly on the adaxial surface, raised slightly on the abaxial surface, the cells between the midvein and the abaxial epidermis without secondary thickening. Inflorescence 1(–3)-flowered. Sepals ovate-deltate, acute to acuminate, abaxial surface with a dense fawn indumentum.

**Notes:** *Boronia* subseries *Rosmarinifoliae* is characterised by small, sessile, simple leaves without secondary thickening in the cells of the abaxial midrib.

*Boronia* subseries *Rosmarinifoliae* contains six species (*B. beeronensis*, *B. forsteri* Durretto, *B. glabra* (Maiden & Betche) Cheel, *B. palasepala* Durretto, *B. rosmarinifolia*, *B. splendida* Durretto) and is found in south-eastern Queensland and north-eastern New South Wales (Fig. 12 in Durretto 1999; Fig. 15 in Durretto 2003).

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